Instrument Manual

LKB

LKB 2120 Varioperpex II Pump

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Introduction

The LKB 2120 Varioperpex II Pump is a versatile peristaltic pump being particularly useful for pumping liquids in chromatographic, electrophoretic and centrifugation techniques and will successfully transfer gases, liquids, sterile solutions, slurries and corrosives in connection with analytical apparatus where a high constancy of flow rate is required.

Risk of contamination during pumping is very low as neither liquids nor gases come in direct contact with the pump parts. The pump will operate against a counter-pressure of up to 200 kPa.

WARNING: This pump must under no circumstances be used in applications on human beings.

Warranty and Liability

LKB-Produkter AB guarantee that their delivered product has been thoroughly tested to ensure that it meets its published specification.

The warranty included in the conditions of delivery is valid only if the product has been used according to the instructions supplied by LKB-Produkter AB.

LKB-Produkter AB can accept no liability for loss or damage, however caused, arising from the faulty or incorrect use of their product.

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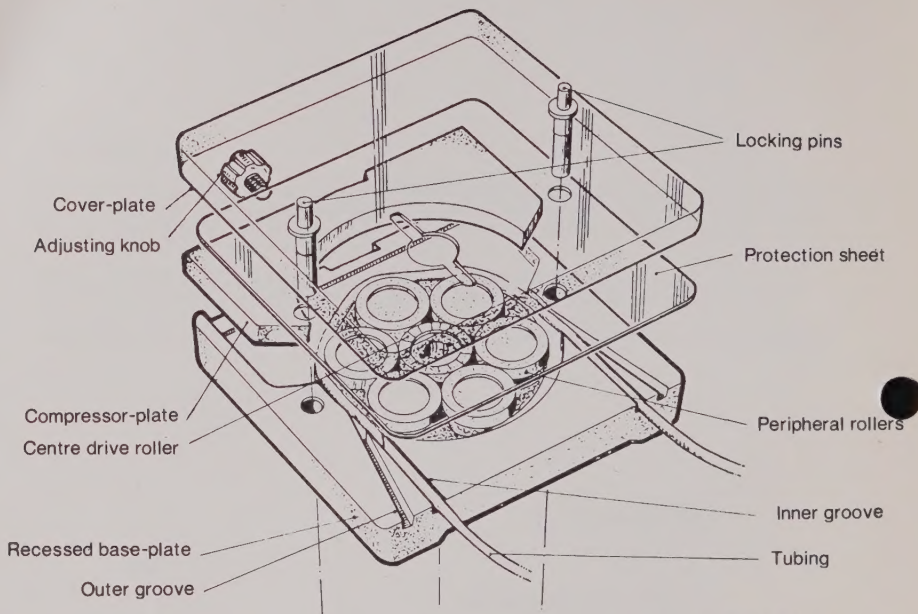
Locking pins
Cover-plate
Adjusting knob
Protection sheet
Compressor-plate
Centre drive roller
Peripheral rollers
Inner groove
Recessed base-plate
Outer groove
Tubing

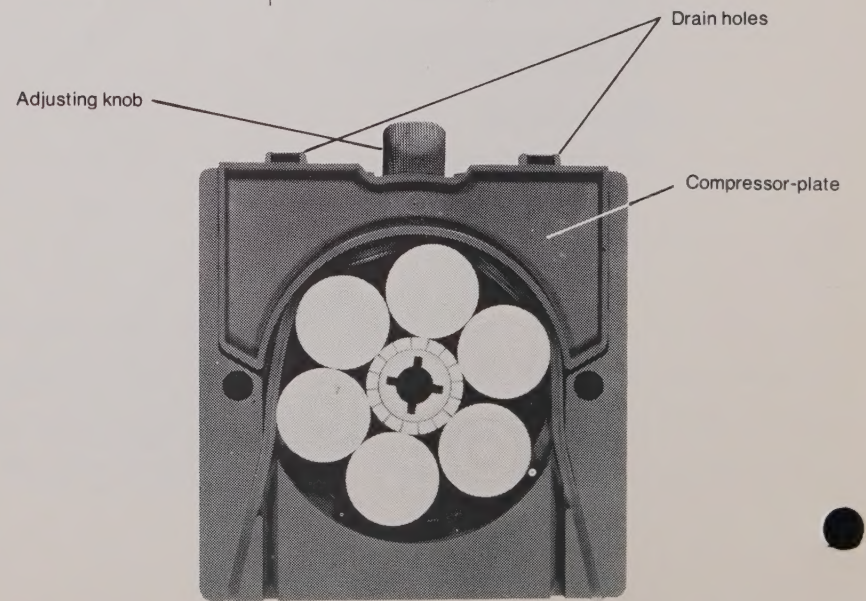
Drain holes
Adjusting knob
Compressor-plate

Fig. 1

I. Physical Description

The pump consists of a Drive-Unit and an Adjustable Pump-Head.

The Drive-Unit — utilizes a stepping motor driving the centre roller of the pump-head via a gear box. The motor speed is regulated by a potentiometer on the front panel which controls an internal oscillator circuit. Speed variation caused by instability of mains voltage or frequency is thus reduced to a minimum.

The Adjustable Pump-Head — comprises a recessed base- plate (Fig. 1) with two channels accepting tubing of 3.0 or 5.0 mm. O.D. The centre drive roller and six freely rotating peripheral rollers are situated in the recessed circular portion of the base-plate. The rear section of the base-plate (compressor-plate) is adjustable, in order to accommodate tubing of different diameters and to minimise tube wear. The tubing is compressed between the rollers and the adjustable compressor-plate to give the peristaltic action of the pump.

A transparent cover-plate with two locking pins secures the pump-head to the body of the pump.

The pump-head is so designed that in the event of accidental spillage, the solution is directed out of the pump-head through two drain holes.

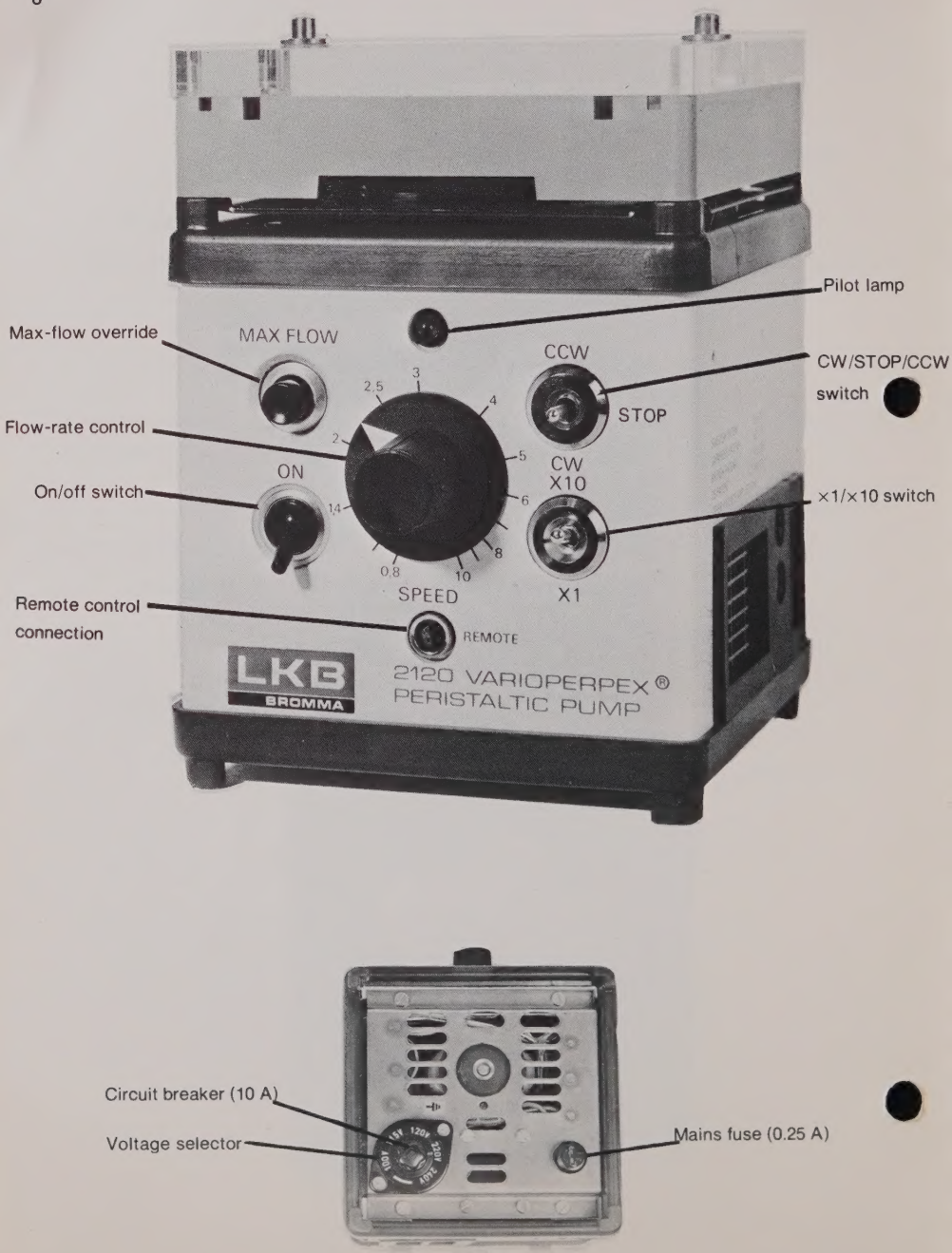
Pilot lamp
Max-flow override
MAX FLOW
CCW
CW/STOP/CCW switch
STOP
Flow-rate control
2.5
3
4
2
5
ON
CW
X10
On/off switch
14
6
×1/×10 switch
0.8
10
8
SPEED
X1
Remote control connection
REMOTE
LKB
BROMMA
2120 VARIOPERPEX®
PERISTALTIC PUMP
Circuit breaker (10 A)
Voltage selector
Mains fuse (0.25 A)

Fig. 2

Controls (Fig. 2)

Mains ON/OFF switch with mains indication pilot lamp.

The CW/STOP/CCW switch has two functions:

a) selection of flow direction — clockwise (CW) or counter-clockwise (CCW)

b) the central STOP position stops the pumping action without isolating the mains voltage.

The X1/X10 switch is used to select the desired flow-rate range.

The two ranges cover a percentage of the maximum flow-rate as follows:

X1 — 0.8 to 10% of maximum flow rate
X10 — 8 to 100% of maximum flow rate

Flow-Rate Control — A continuously variable potentiometer which determines the flow-rate within the chosen range.

The MAX-FLOW override push-button enables the operator to obtain maximum flow-rate regardless of the setting on the Flow-Rate Control.

The Remote Control Connection enables the user to

- monitor the flow-rate
- STOP or START the pump
- control the movement of the LKB REDIRAC fraction collector to give precise fraction volumes.

Voltage Selector — The following mains input voltages can be selected on the mains transformer of the pump: 100/115/120/220/240±10%, 50/60 Hz.

Fuse — The pump is protected by a 0.25 A fuse.

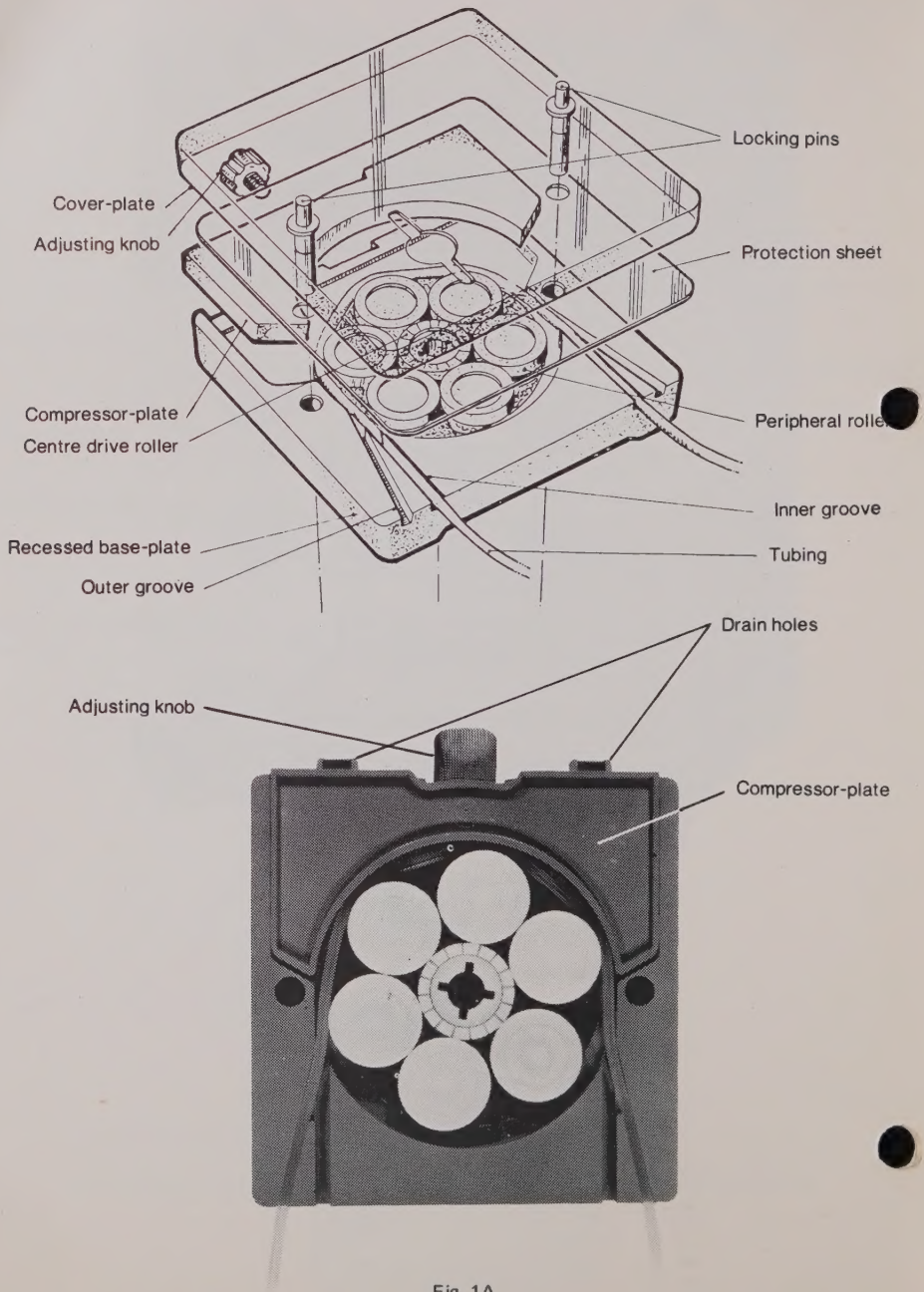
Locking pins
Cover-plate
Adjusting knob
Protection sheet
Compressor-plate
Centre drive roller
Peripheral roller
Inner groove
Recessed base-plate
Outer groove
Tubing
Drain holes
Adjusting knob
Compressor-plate

Fig. 1A

II. Installation and Operation

1. Check that the voltage selector on the bottom plate is set to the correct mains voltage, and ensure a 0.25 amp fuse is in the mains fuse holder.
2. Remove cover-plate and protection sheet by first pushing down the locking pins and then releasing them.
3. Remove polystyrene packing disc.
4. Unscrew adjusting knob just enough to allow the compressor-plate to be withdrawn approx. 5 mm.
5. Locate centre drive roller (smaller diameter uppermost) onto gear box drive-shaft and then place the six peripheral rollers around the centre drive roller.
6. Decide which size of silicon rubber tubing to use. Place tubing with 1.3 mm I.D. into the **outer** groove and between the rollers and compressor-plate, according to the figure. Tubing with 3.0 mm I.D. should be placed in the **inner** groove.

   NOTE: DO NOT STRETCH THE TUBING.
7. Replace protection sheet and cover-plate, and push down both locking pins.
8. Connect the power cable to mains supply.
9. Set the pump to maximum flow-rate by setting X1/X10 switch to X10 and Flow-Rate Knob to 10.
10. Immerse both ends of the tubing in a beaker of water and switch on pump. Ensure CW/STOP/CCW switch is in either the CW or CCW position.
11. Slowly tighten the adjusting knob until a pumping effect is noticed (bubbles in the water). Observe the position of the dot on the adjusting knob. Then turn the knob a half-turn further. Now a counter-pressure of approx. 200 kPa is obtained. This adjustment gives the possibility of varying the counter-pressure. However, the higher the counter-pressure, the greater the wear on the tubing.

NOTE Should a kink appear in the tubing at the outlet side of the pump, after installation, **gently** pull the tubing until the kink is removed.

12. Set the pump, approximately, to the desired flow-rate with switch X1/X10 and Flow-Rate Knob.
13. Measure the flow-rate and adjust Flow-Rate Knob until the desired flow-rate is obtained. The pump is now ready for use.

NOTE The pumping volume varies with the inner diameter of the tubing used. When changing tubing the tubing diameter tolerances must be considered. Please note that wear will affect the inner diameter. Determine the actual flow-rate by using a measuring cylinder and a stop watch.

14. If a faster flow-rate is desired whilst setting-up or terminating an experiment, the instant Max-Flow push-button can be used without changing the calibrated flow-rate.

NOTE 1: Silicon rubber tubing is resistant to a wide range of chemicals but should there be any doubt please refer to the enclosed booklet "Silicon Rubber Tubing". It is also possible to use alternative tubing e.g. Tygon or Viton tubing.

NOTE 2: Before commencing extended operation check that the tubing is in good condition, and set the compressor-plate to the correct counter-pressure (refer to point 11 above). The use of inflammable solvents in unattended operations is not recommended.

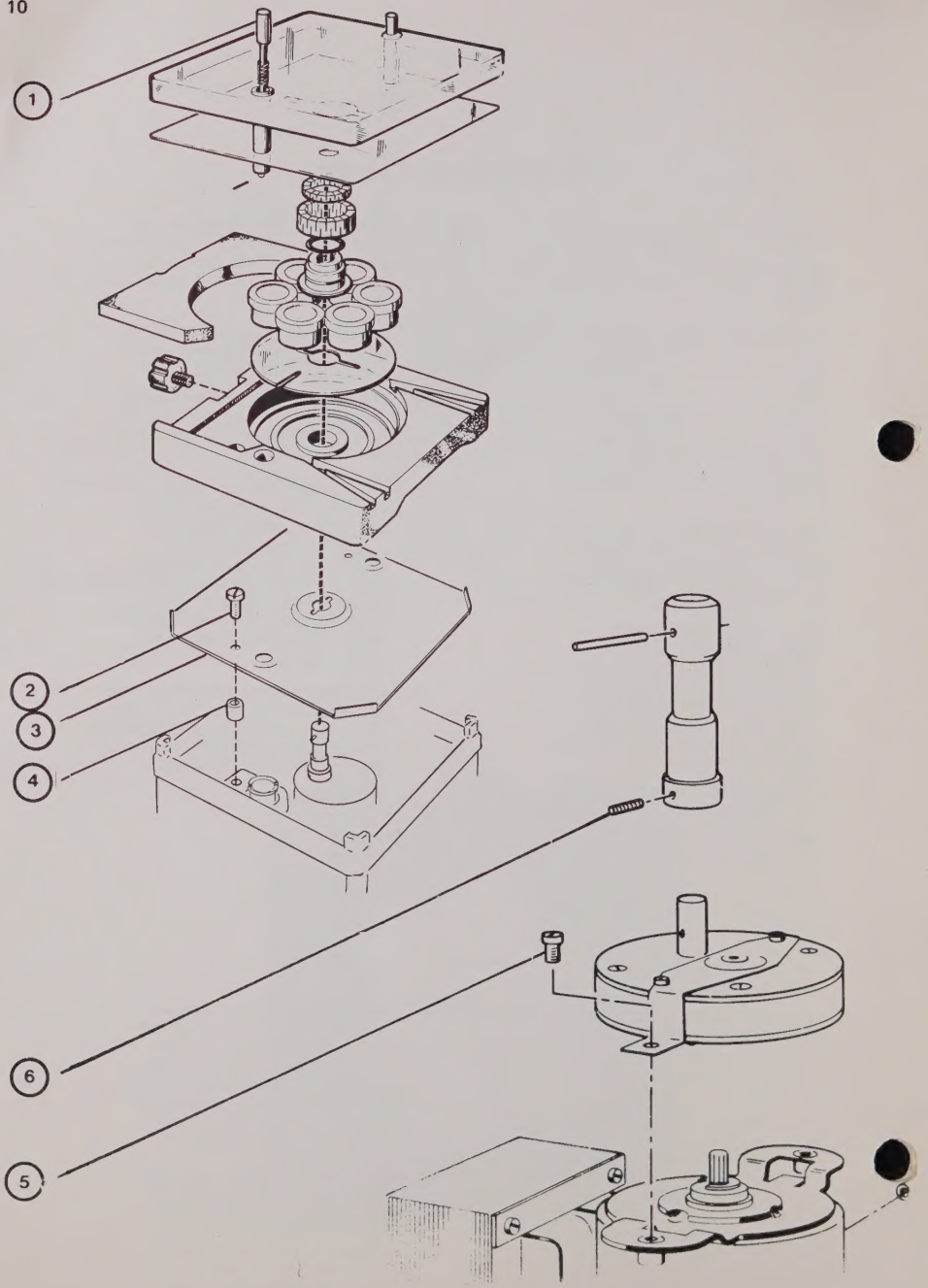

Fig. 3

Replacement of Gear Box

The LKB Varioperpex II Pump is delivered with a standard gear box, ratio 1:8. There is an alternative gear box available, ratio 1:30. (See Technical Specification for actual flow rates).

The following procedure should be carried out when exchanging gear boxes. (Refer to Fig. 3).

1. **Remove** the mains plug from mains outlet.
2. Release locking pins (3.1) and remove pump-head complete.
3. Release and remove screws (3.2), carefully lift off protection cover (3.3) and collect the two spacers (3.4). (It is now possible to see the gear box and its two securing screws.)
4. Release the two securing screws (3.5) and remove the gear box. The driving-pin on the gear box just removed must be transferred to the alternative gear box.
5. Release driving-pin from gear box shaft by unscrewing grub-screw (3.6) with an Allen key (1.5 mm).
6. Place driving-pin on shaft of replacement gear box and secure with grub-screw (3.6).
7. Position gear box on top of motor, ensuring that the driving-pin is towards the back of the pump.
8. Secure gear box with screws (3.5).
9. Reposition the two spacers (3.4).
10. Replace protection cover (with the four lipped-corners uppermost) and secure with screws (3.2).
11. Replace pump-head and secure by depressing locking pins.
12. Re-connect mains supply.

III. Maintenance

Rollers:

The roller housing and the rollers should be cleaned with soapy water or methanol **every week if the pump is used frequently.** When reassembling, apply a very thin layer of silicon grease on the parts of the circular disc and protection sheet facing the rollers.

Tubing:

When cleaning the rollers the tubing should be checked for wear and exchanged, or repositioned, if needed. Some tubing suplied by LKB is coated with talc. Remove this with soapy water or methanol before using the tubing in the pump.

IV. Technical Specification

No. of channels one
Tubing dimensions 1.3 mm I.D. (3.0 mm O.D.)
3.0 mm I.D. (5.0 mm O.D.)

Max. counter-pressure 200 kPa
Standard gear box: ratio 1:8
Flow-rates with standard gear box

TUBING	SWITCH	FLOW-RATE
1.3 mm I.D.	X1	0.6 to 8 ml/h
	X10	6.4 to 80 ml/h
3.0 mm I.D.	X1	3.2 to 40 ml/h
	X10	32 to 400 ml/h

Alternative gear box: ratio 1:30

Flow-rates with alternative gear box

TUBING	SWITCH	FLOW-RATE
1.3 mm I.D.	X1	0.2 to 2.4 ml/h
	X10	2.0 to 25 ml/h
3.0 mm I.D.	X1	1.0 to 11 ml/h
	X10	8.6 to 104 ml/h

Operating temperature range $0^{o}C$ to $40^{o}C$
Remote control

Pin 1: Ground
Pin 2: No connection
Pin 3: Pulse frequency proportional to pump speed. Open-collector type, max. load: 15V, 30mA.
Pin 4: Roller stop. If Pin 4 is grounded to Pin 1, the roller movement is inhibited.

Mains supply 100/115/120/220/240V±10%, 50/60 Hz
Power consumption 15 W
Overall dimensions (DxWxH) 150 x 120 x 170 mm
Net weight 2.5 kg
Gross weight 3.5 kg

V. Equipment Supplied & Optional Items

Equipment Supplied

Cat. No.	Description
2120-001	Varioperpex II Pump for 115V, 60 Hz, including 2115-112 Pump-Head complete 2040-105 Connecting Cable 95 46 0138 Mains Cable (U.S. type) 94 92 6275 Fuse Kit 0.25 A (U.S. type) 2030-964 Silicon Rubber Tubing, 1.3 mm I.D. (3.0 mm O.D.), length 2 m 2030-963 Silicon Rubber Tubing, 3.0 mm I.D. (5.0 mm O.D.), length 2 m
2120-002	Varioperpex II Pump, same as 2120-001 but for 220V, 50 Hz, including 95 46 0137 Mains Cable (European type) 94 92 6274 Fuse Kit 0.25 A (European type)

Optional Items

2120–130	Alternative Gear Box – Ratio 1:30 (see Technical Specification for flow rate ranges)
2115–112	Pump-Head complete
2030–963	Silicon Rubber Tubing, 3.0 mm I.D. (5.0 mm O.D.), length 2 m
2030–964	Silicon Rubber Tubing, 1.3 mm I.D. (3.0 mm O.D.), length 2 m
2030–941	PVC (Tygon) Tubing, 1.5 mm I.D., (3.0 mm O.D.), length 1.5 m
2030–951	Viton Tubing, 1.5 mm I.D., (3.0 mm O.D.), length 1 mm

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